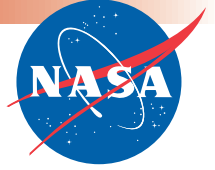


# SPACE LAUNCH INITIATIVE

## *Technology Summary*



### *Vehicle Subsystems*

A second generation reusable launch system will require advanced technologies in actuators, power and avionics. Flight control actuation systems will call for high-horsepower actuation with peak power or load leveling devices. Advanced power with high voltage capability will be necessary for second generation reusable launch systems to support more missions and quick turnarounds with significantly lower or no maintenance. A robust avionics system with minimum cooling requirements, reduced weight, and minor maintenance needs will be required to reduce vehicle operating costs.

The Vehicle Subsystems Project team will develop and test the advanced technologies needed to fulfill these requirements. They are critical elements needed to meet the goals of the Space Launch Initiative — to significantly increase safety, improve reliability and reduce payload launch costs from today's \$10,000 per pound to \$1,000 per pound.

Advanced high-horsepower actuators will be needed for vehicle flight controls on second generation reusable launch vehicles. Elimination of centralized-hydraulics actuation systems will decrease maintenance requirements and, in turn, decrease vehicle operating costs. Advanced electromechanical and electrohydrostatic actuators will be developed as well as peak power or load leveling devices to enhance actuator operations.

The significant power needed for the actuation system and the other power requirements of second generation reusable launch vehicles requires development of advanced power systems. The Vehicle Subsystems team will engage in technology development on advanced power generation, energy storage and power distribution and management systems.

Robust, low life cycle cost avionics will be used on the second generation reusable launch vehicle to implement an integrated architecture approach that addresses all the traditional roles of avionics and can integrate future avionics advancements. This will include advanced development avionics for vehicle management, data acquisition, telemetry and/or recording, guidance, navigation and control. Redundancy management techniques will be integrated to increase safety.

Glenn Research Center in Cleveland, Ohio, will manage the Vehicle Subsystems Project. Advance technology development on the actuators and power in support of the Project will be led from Glenn. Advance technology development on avionics in support of the Project will be led from Marshall Space Flight Center in Huntsville, Ala.

The Marshall Space Flight Center leads the Space Launch Initiative with support from Glenn Research Center; Ames Research Center in Moffett Field, Calif.; Stennis Space Center in Bay St. Louis, Miss.; Kennedy Space Center, Florida; Dryden Flight Research Center in Edwards, Calif.; Johnson Space Center in Houston, Texas; Langley Research Center in Hampton, Va.; the Jet Propulsion Laboratory in Pasadena, Calif.; and the Air Force Research Laboratory, which includes research and development facilities at nine United States Air Force bases nationwide.